REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-24 are pending in the present application. Claims 1, 13, and 18 are amended by the present amendment.

In the outstanding Office Action, the specification was objected to; Claims 1-3, 6, 11-15, 18, 22, and 24 were rejected under 35 U.S.C. § 112, first paragraph; Claims 1-3, 11, 13-15, and 23 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher et al. (U.S. Patent No. 5,086,327, herein "Rosencher") in view of Snow (U.S. Patent No. 5,510,627) and Katoh (U.S. Patent No. 5,041,882); and Claims 6, 12, 18, and 24 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher, Snow, Katoh, and Nanbu (Japanese Patent No. 361054673).

Applicants thank Examiner Brock for the courtesy of an interview extended to Applicants' representative on October 24, 2003. During the interview differences between the claims and the applied art were discussed. Further, claim amendments clarifying the claims over the applied art were discussed. The present response sets forth those discussed claim amendments. Examiner Brock indicated that the claim amendments would require further search and consideration. Arguments presented during the interview are reiterated below.

Regarding the objection to the specification and the rejection of Claims 1-3, 6, 11-15, 18, 22, and 24 under 35 U.S.C. § 112, first paragraph, and as discussed during the interview and agreed with Examiner Brock, independent Claims 1 and 13 are amended to recite the language "at least an order of magnitude" instead of the language "at least ten times," as recited in the

Amendment filed on June 20, 2003. Accordingly, it is respectfully submitted that the objection to the specification and the rejection under 35 U.S.C. § 112, first paragraph, be withdrawn.

Claims 1-3, 11, 13-15, and 23 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher in view of Snow and Katoh. That rejection is respectfully traversed.

Independent Claim 1 is amended to more clearly recite that an "electron storage layer includes a metastable level," as disclosed in the specification for example at page 8, lines 23-26, and that a "transfer barrier layer includes a component having a concentration that varies linearly, decreasing in a direction from said quantum well to said electron storage layer," as also disclosed in the specification for example at page 9, lines 35-39. No new matter is believed to be added.

Amended independent Claim 1 is directed to an electromagnetic wave detector including at least one quantum well, an electron storage layer, and a transfer barrier layer that separates the electron storage layer from the quantum well. In addition, the electron storage layer includes a metastable level and the transfer barrier layer includes a component having a concentration that varies linearly, decreasing in a direction from the quantum well to the electron storage layer. In a non-limiting example, Figure 2 shows the quantum well layer 3, the transfer barrier layer 4, and the electron storage layer 5.

As disclosed in the specification at page 1, lines 22-35, a problem identified by the present inventors in the background art is that a "high rate of carrier recombination" appears between successive quantum wells, and therefore, the "performance characteristics of these

detectors" are restricted.[1] The claimed device advantageously solves that problem by including an electron storage layer having a metastable level.

Rosencher discloses in Figures 2a, 2b, and 3 a quantum well 3 and 5 having an internal barrier 4.[2] However, as discussed during the interview, Rosencher does not teach or suggest an electron storage layer including a metastable level and a transfer barrier layer including a component having a concentration that varies linearly, decreasing in a direction from a quantum well to an electron storage layer.

Snow discloses a photodetector including multiple quantum well detectors having multiple barrier layers with a certain thickness placed between the multiple quantum wells. However, as discussed during the interview, Snow does not teach or suggest an electron storage layer including a metastable level and a transfer barrier layer including a component having a concentration that varies linearly, decreasing in a direction from a quantum well to an electron storage layer.

Katoh discloses in Figure 4 a heterojunction of a bipolar transistor having a different "composition ratio β of P to As" impurities in a base/emitter junction.[3] However, as discussed during the interview, Katoh does not teach or suggest an electron storage layer including a metastable level and a transfer barrier layer including a component having a concentration that varies linearly, decreasing in a direction from a quantum well to an electron storage layer. To the contrary, Katoh discloses at column 3, lines 20-30, that the ratio β is constant across the base/emitter region.

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[1] Specification, page 1, lines 22-35.
[2] Rosencher, Abstract, and at column 4, lines 14-16.
[3] Katoh, column 3, lines 20-30, and Figure 4.

Accordingly, it is respectfully submitted that independent Claim 1 and each of the claims depending therefrom patentably distinguish over the applied art. In addition, as discussed during the interview, Shakouri et al. (cited art not applied in the outstanding Office Action) do not teach or suggest an electron storage layer having a metastable level.

Independent Claim 13 is amended to more clearly recite that an electron storage layer includes a metastable level and a counting unit includes two electrodes in direct contact to the electron storage layer, and the two electrodes are separated from the quantum well. The claim amendments find support in the specification, for example, at page 8, lines 23-26, and in Figure 4.

As discussed above, Rosencher, Snow, and Katoh do not teach or suggest an electron storage layer including a metastable level. In addition, as discussed during the interview, none of the applied art teaches or discloses two electrodes in direct contact to the electron storage layer and the two electrodes separated from the quantum well. Accordingly, it is respectfully submitted that independent Claim 13 and each of the claims depending therefrom patentably distinguish over the applied art.

Claims 6, 12, 18, and 24 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher, Snow, Katoh, and Nanbu. That rejection is respectfully traversed.

The outstanding Office Action relies on Nanbu for disclosing in Figure 1 first and second ohmic contacts 4 and 5 located in a layer 10. Nanbu discloses in Figure 1 a transistor structure having a source electrode 4, a drain electron 5, and a layer 10. However, Nanbu does not teach or suggest an electron storage layer having a metastable level, a quantum well, and two electrodes of a counting unit separated from the quantum well, as required in independent Claim 13. In addition, Claims 6, 12, 18, and 24 depend on independent Claims 1 and 13, which

are believed to be allowable as noted above. Accordingly, it is respectfully submitted that dependent Claims 6, 12, 18, and 24 are also allowable.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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